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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/627,571	07/28/2000	Haixiang Liang	1005-0018	2336

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ZAGORIN O'BRIEN & GRAHAM, L.L.P.  
7600B N. CAPITAL OF TEXAS HWY.  
SUITE 350  
AUSTIN, TX 78731

EXAMINER

\*CHANG, EDITH M

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 07/22/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/627,571

Applicant(s)

LIANG, HAIXIANG

Examiner

Edith M Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 April 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because there are 6 pages of drawing, however the page indicator (e.g. 1/5, 2/5, 3/5, 4/5, 5/5, and 7/7) on the top of each drawing page is not correctly reflecting the number of page in the six pages.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Response to Arguments***

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2. Applicant's arguments filed April 30 2004 have been fully considered. The rejections of claims 1-12, and 16 under 35 U.S.C. 112 are withdrawn. The arguments of the rejections under 35 U.S.C. 102(e) and U.S.C. 103(a) are not persuasive.

**Argument:** Page 14, Regarding claim 1: the Office Action relies on col. 3 lines 35-40 and col. 5, lines 53-65 of Okunev to supply this teaching.

**Response:** The office action uses the Okunev's invention as the reference as a whole. The columns and lines indicate some of the places in the references providing the teachings.

**Argument:** Page 15, Claim 1: Nowhere does Okunev teach or suggest assigning constellation points for a constellation index based on one or more corresponding characteristic sets including contributions of symbol estimates from phase intervals associated with one or more other constellation indices, as required by claim 1.

**Response:** In FIG. 1b (designing constellations for utilizing the translation tables) of Okunev, it generates constellations for each slot/phase in every group/table of the six translation tables, there are six constellations (column 5 lines 53-55, column 6 lines 4-8). The figures 8a-8c show the steps set forth in FIG. 1b.

FIG. 1b 120 & 130, the constellations design is optimized per frame: column 6 lines 17-33 wherein the one or more characteristic sets (the signal level and distance are two characteristics column 3 lines 1-5) include contributions of symbol estimates from phase intervals associated with one or more other constellation indices (the 870-874 FIG. 8c & column 6 line 17-22 provide the evidence of contributions of symbol estimates from phase intervals/shots associated with one or more other constellation indices, wherein the frame power

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involves/contributes symbol estimates from all slots/indices of other constellation). Therefore Okunev teach or suggest assigning constellation points for a constellation index based on one or more corresponding characteristic sets including contributions of symbol estimates from phase intervals associated with one or more other constellation indices, as cited in the claim.

**Argument:** Page 15, Regarding claim 13; and Page 16, Regarding claim 17: Nowhere does Okunev teach or suggest selecting constellation points based on characteristic groups associated with one or more respective phases, as required by claim 13.

**Response:** FIG.1b 120 & 130, the constellations points selection is optimized per frame: column 6 lines 17-lines 33 wherein constellation points selection is based on the characteristic groups (the signal level and distance are two characteristics column 3 lines 1-5) associated with the one or more respective phases, and the 870-874 FIG.8c & column 6 line17-22 indicate selecting constellation points based on characteristic groups associated with one or more respective phases, as cited in the claims.

**Argument:** Page 16, Regarding claim 1: Nowhere does Davis teach or suggest calculating a characteristic set of symbol estimates for each group of phase intervals.

**Response:** Column 6 lines 30-37 & column 6 line 65-column 7 line 2, wherein the number  $M_i$ /the number of voltage levels, is the calculation a characteristic set of symbol estimates for each group of phase intervals.

**Argument:** Page 17, Regarding claim 13; Page 18, Regarding claims 20 and 27: Nowhere does Davis teach or suggest grouping the N phases into a set of characteristic groups according to aggregated effects of the periodic impairments.

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**Response:** Column 6 lines 30-35 wherein grouping the N slots/phases into a set of characteristic groups ( $M_i$ ,  $i=0,...,5$ ) performs via the modulus encoding. Column 6 line 65-column 7 line 2, and column 7 lines 20-24, wherein the grouping is according to the extrapolated voltage levels (the voltage levels are used for grouping). The extrapolated voltage levels are the aggregated effects of the periodic impairments. Therefore, Davis teach or suggest grouping the N phases into a set of characteristic groups according to aggregated effects of the periodic impairments as cited in the claims.

**Argument:** Page 19, Claim 20: Nowhere does Okunev teach or suggest selecting constellation points based on characteristic groups associated with respective phase intervals, the grouping of phases into characteristic groups being based on aggregate effects of periodic impairments, as required by claim 20.

**Response:** Okunev teach or suggest selecting constellation points based on characteristic groups associated with respective phase intervals (refer to the rationale of the response of the arguments of claims 1 and 13) and grouping of phases into characteristic groups being based on aggregate effects of periodic impairments.

With respect to grouping of phases into characteristic groups being based on aggregate effects of periodic impairments, FIG. 1a-2 100a & 100b indicate the aggregate effects wherein the  $NRB < 5$  or  $NRB \geq 5$  is the aggregated effects of periodic impairments, so the grouping is based on aggregate effects. Therefore Okunev teach or suggest grouping of phases into characteristic groups being based on aggregate effects of periodic impairments.

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Okunev teach or suggest selecting constellation points based on characteristic groups associated with respective phase intervals and grouping of phases into characteristic groups being based on aggregate effects of periodic impairments as cited in the claim.

**Argument:** Page 19, Claim 20: Krishnan fails to teach or suggest selecting constellation points based on characteristic groups associated with respective phase intervals, the grouping of phases into characteristic groups being based on aggregate effects of periodic impairments, as required by claim 20.

**Response:** Krishnan teaches the comprised means for the digital impairment learning sequence (refer to the rationale of the claim 20 rejection of the previous office action), Okunev discloses selecting constellation points based on characteristic groups associated with respective phase intervals, the grouping of phases into characteristic groups being based on aggregate effects of periodic impairments. As Krishnan's invention is an improved digital impairment learning sequence, having Krishnan's teaching in Okunev's devices/apparatus is obvious that the combined/modified devices has the benefit of deriving optimum transmit symbol constellations (Abstract Krishnan/'296) and obtain the invention as specified in the claim.

The rejections are upheld in the following:

*Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-4, 7, 9-10, 13-17, 19, & 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Okunev et al. (US 6272171 B1).

Regarding **claims 1-4**, Okunev et al. discloses a method comprising: grouping phase intervals based on similarity of aggregated impairment and calculating a characteristic set of symbol estimates (column 2 line 60-column 3 line 10, where the phase intervals are the slots, aggregated impairment is such as RBS, signal levels is the symbol estimates); and assigning constellation points for a constellation index based on one or more characteristic sets (column 3 lines 35-40, column 5 lines 53-65); performing the assigning for each J distinct constellation indices selecting successive candidate next constellation points that, based on symbol estimates, satisfy a distance metric, and assigning lowest power ones (FIG.8a,FIG.8b, column 18 line 35-column 19 line25, column 21 lines 60-65). Clearly in the Abstract, Summary of the invention, FIG.8 and the descriptions of the figures, Okunev et al. discloses the inventions of claims 1-4 wherein grouping phase intervals and calculating symbol estimates (column 2 line60-column 3 line 10), and assigning optimal constellation points based on the DIL received by distance metric, then power limitation (column 5 lines 53-65).



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Regarding **claim 7**, Okunev et al. discloses a single phase interval corresponds to each constellation index (column 18 lines 34-36).

Regarding **claim 9**, Okunev et al. discloses performing the grouping based on a received impairment compensation sequence that places at least one instance of each symbol in each of the phase intervals (column 3 lines 1-10).

Regarding **claim 10**, Okunev et al. discloses communicating the constellation points to a remote communications device (column 2 lines 10-20).

Regarding **claims 13-17, & 19**, Okunev et al. discloses method comprising: receiving a sequence of symbol estimates organized into N phases (column 2 line 60-column 3 line10, column 3 lines 53 where i is equivalent to N), one or more of the phases corresponding to each of J constellation indices (FIG. 1b); grouping the N phases into a set of groups according to aggregated effects of the periodic impairment (column 2 line 60-column 3 line10), and selecting constellation points based on the groups (column 5 lines 53-67); selecting constellation points satisfy a distance metric, assigning lowest power ones; selecting for constellation, one of the next lowest power constellation points for which the distance metric exceeds a minimum distance metric; and adding a particular constellation ( 866-876 FIG.8c); and each constellation ( $K=1,..6$ , where the K is J) is associated with a single group (860 FIG.8c), and the constellation point selecting to this index including selecting a next lowest power constellation point for which a distance metric exceeds a minimum distance metric (column 5 lines 60-67, FIG.8b). Clearly in the Abstract, Summary of the invention, FIG.8 and the descriptions of the figures, Okunev et al. discloses the inventions of claims 1-4 wherein grouping phase intervals and calculating symbol

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estimates (column 2 line 60-column 3 line 10), and assigning optimal constellation points based on the DIL received by distance metric, then power limitation (column 5 lines 53-65).

Regarding **claim 27**, Okunev et al. discloses a computer program product (column 22 lines 60-65, all flow charts are for the instructions) of the modem comprising the subject matter claimed (refer to rationale of claim 13).

5. Claims 1, 13, 20, 25, & 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Davis et al. (US 6661847 B1).

Regarding **claim 1**, Davis et al. discloses the method (FIG.3) comprising: grouping phase intervals based on similarity of aggregate impairment and calculating a characteristic set of symbol estimates (column 6 lines 30-40, column 6 line 65-column 7 line 2, column 7 lines 10-20, lines 41-46), and assigning constellation points for one or more characteristic sets (column 6 line 65-column 7 line 2). Clearly in the Abstract, Summary of the invention, FIG.3 and the descriptions of the figures, David et al. discloses the invention.

Regarding **claim 13**, Davis et al. discloses the method comprising: receiving a sequence of symbol estimates organized into N phases (column 7 lines 10-20, where the interval i is the phases), grouping the N phases into a set of characteristic groups (column 7 lines 45-67), and for each of the constellation, selecting constellation points based on the characteristic groups (column 8 lines 5-65).

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Regarding **claims 20 & 25**, Davis et al. discloses the communication device (column 10 lines 35-40, FIG.1) comprising: a receive path/means for (10-60 FIG.1), and an impairment compensator/means for organizing a received sequence of symbol estimates, /for grouping, /for constellation (column 6 lines 10-20, 60 FIG.1).

Regarding **claim 27**, Davis et al. discloses a computer program product comprising: instructions to execute the method (column 6 lines 5-20, column 10 lines 35-67, column 16 lines 40-60).

### *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 5-6, 8, 11-12, & 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okunev et al. (US 6272171 B1) in view of David et al. (US 6661847 B1).

Regarding **claims 5 & 6**, Okunev et al. teaches PCM modem frame (six slots) but does not explicitly specify a  $k^{\text{th}}$  one of the phase intervals, a  $(k+6)^{\text{th}}$ , a  $(k+12)^{\text{th}}$ , and a  $(k+18)^{\text{th}}$  intervals. However Davis et al. teaches for each of a 6T frame/of the 6 intervals in constellation generation (column 2 lines 15-20, column 7 lines 10-15) that includes +6, +12, and +18. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Davis et al.'s teaching in Okunev et al.'s optimal constellation method to map represented by

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digital impairment parameters between transmitted ucodes and received signal levels to select a set of signal constellations for downstream data transmission (column 3 lines 27-30).

Regarding **claims 8 & 18**, Okunev et al. discloses the constellation index is one of six constellations (FIG. 1b, column 6 lines 6-7), but does not explicitly specify the phase intervals number twenty-four. However Davis et al. teaches for each of the 6 intervals in constellation generation (column 7 lines 10-15) that includes +24. As Okunev et al. teaches PCM modem frame (six slots), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Davis et al.'s teaching in Okunev et al.'s optimal constellation method to map represented by digital impairment parameters between transmitted ucodes and received signal levels to improve the selecting a set of signal constellations for downstream data (column 3 lines 27-30) for the PCM modem.

Regarding **claims 11 & 12**, Okunev et al. discloses the symbol estimates including amplitude estimates (column 1 lines 60-62, column 2 lines 6-21, wherein the Ucodes used as the standard), but does not explicitly specify the Ucode in estimates (which is part of the standard). However Davis et al. teaches the estimates and distance metric corresponding to the Ucodes (Abstract, FIG.3, column 7 lines 42-45). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Davis et al.'s teaching in Okunev et al.'s optimal constellation method to accommodate the standard and to determine the range of available and usable ucodes and an initial minimum spacing between signal levels (column 3 lines 65).

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8. Claims 20-23, 25-26, & 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okunev et al. (US 6272171 B1) in view of Krishnan et al. (US 6301296 B1).

Regarding **claims 20-21, 23 & 25-26**, except enlist the elements of the device/apparatus, Okunev et al. discloses all subject matter claimed (refer rationale of claim 13) and teaches the devices and apparatus utilizing the methods (column 2 lines 47-50). However Krishnan et al. teaches the comprised means for the digital impairment learning sequence (Figure 3, and Figure 4): impairment compensator (10 Figure 4), means for organizing a received sequence, means for grouping the N phases; and means for selecting constellation points (132, 131, 11 Figure 4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Krishnan et al.'s teaching in Okunev et al.'s devices/apparatus to implement the method to derive optimum transmit symbol constellations for a modem (Abstract).

Regarding **claim 22**, Okunev et al. discloses a transmit path communicating the constellation points to a remote communications device (column 2 lines 10-20).

Regarding **claim 28**, Okunev et al. does not specify the computer readable medium, however Krishnan et al. teaches the medium for the instructions (column 5 lines 3-10, 13-13A Figure 3) where the medium can be selected from the list cited in the claim as the inherence of the characteristics of the medium and the system configuration that does not show the uniqueness.

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9. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okunev et al. (US 6272171 B1) in view of Krishnan et al. (US 6301296 B1) as applied to claim 20 above, and further in view of David et al. (US 6661847 B1).

Regarding **claim 24**, Okunev et al. discloses the constellation index is one of six constellations (FIG. 1b, column 6 lines 6-7), but does not explicitly specify the phase intervals number twenty-four. However Davis et al. teaches for each of the 6 intervals in constellation generation (column 7 lines 10-15) that includes +24. As Okunev et al. teaches PCM modem frame (six slots), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the Davis et al.'s teaching in Okunev et al.'s optimal constellation method to map represented by digital impairment parameters between transmitted ucodes and received signal levels to select a set of signal constellations for downstream data (column 3 lines 27-30).

### *Conclusion*

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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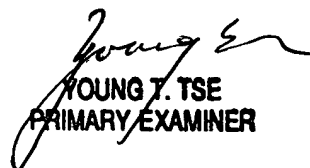
however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Chang whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 703-308-7728. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edith Chang  
July 13, 2004

  
YOUNG T. TSE  
PRIMARY EXAMINER